

Patent claims

1. A washing device for a glass pane in a vehicle, in particular for a windshield of a motor vehicle, having a washing-water line (15) which runs along the lower edge of the glass pane and having at least one washing-water nozzle (14) which is connected to the washing-water line (15) and has at least one spray opening (22) and a non-return valve (21) which is arranged upstream of the at least one spray opening (22), characterized in that the washing-water nozzle (14) has a pipe section (18) and a valve housing (19) which contains the non-return valve (21) and is flange-connected to the outside of the pipe section (18) with its housing axis parallel to the axis of the pipe section, in that the at least one spray opening (22) is arranged in the valve housing (19) with its opening normal running transverse to the housing axis, and in that the pipe section (18) is inserted into an intersection point of the washing-water line (15).

2. The washing device as claimed in claim 1, characterized in that the pipe section (18) and the valve housing (19) are composed of a material which conducts heat well, and in that a continuous, insulated heating wire (36) runs in the washing water-carrying interior of the washing-water line (15).

3. The washing device as claimed in claim 1 or 2, characterized in that the spray opening (22) is integrated in a spray module (25) which is exchangeably inserted in a housing opening (26) in the valve housing (19).

4. The washing device as claimed in claim 3, characterized in that the housing opening (26) is surrounded by a collar (27) which is formed on the valve housing (19),

and in that the spray module (25) is formed such that it can be clipped into the collar (27).

5. The washing device as claimed in claim 3 or 4, characterized in that the spray module (25) has a lower and an upper module plate (29, 30) with aligned through-holes (31, 32), and in that a nozzle body (33) which has the at least one spray opening (22) is pivotably clamped between the module plates (29, 30).

6. The washing device as claimed in one of claims 1-5, characterized in that a valve inlet chamber (23), which is connected to the interior of the pipe section (18), and a valve outlet chamber (24), which is provided with the at least one spray opening (22), are formed in the valve housing (19), these chambers being arranged in series in the direction of the housing axis, and in that the non-return valve (21) is arranged between the valve inlet and outlet chambers (23, 24).

7. The washing device as claimed in one of claims 1-6, characterized the pipe section (18) and the valve housing (19) are elongate.

8. The washing device as claimed in claim 7, characterized the valve housing (19) is of flat design.

9. The washing device as claimed in claim 7, characterized the valve housing (19) is of circular design with a preferably minimal diameter.

10. The washing device as claimed in one of claims 1-9, characterized in that the washing-water line (15) is a flexible hose (17) which has at least two hose sections (171, 172) which are each connected to one another by one pipe section (18).

11. The washing device as claimed in claim 10, characterized in that one connection nipple (34, 35) is formed at each of the two free ends of the pipe section (18), one end of a hose section (171 or 172) being pushed onto said nipple.

12. The washing device as claimed in claim 10 or 11, characterized in that the hose (17) is situated in a shaft (13) which is open at the top, has a U-shaped cross section and whose shaft wall (131), which is relatively close to the glass pane in the vehicle, has at least one cutout (16) into which the at least one spray opening (22) in the washing-water nozzle (14) projects.

13. The washing device as claimed in claim 12, characterized in that the shaft (13) is an integral constituent part of a cover (11) which, together with a part of an engine hood (10) which rests on said cover, encloses an air supply duct (12), and in that the engine hood (10) closes the shaft (13) from above.

14. The washing device as claimed in one of claims 1-9, characterized in that the washing-water line (15) is in the form of a duct which is integrated in a cover (11) which, together with a part of an engine hood (10) which rests on said cover, encloses an air supply duct.